designation is one of common acceptance among the people.

Scientific writers, like Mr. John Elfreth Watkins, in the Technical World of February, 1905, while speaking rather derisively, bears testimony to the fact of this designation of the term cyclone among the people. He said:

"A roaring, snapping, death-sowing funnel-cloud looms up in the sky, descends to earth, ploughs through life and property for a mile or two, ascends into the air whence it came, and passes off. Ten to one the newspapers will state that a 'cyclone' visited the affected region. It all results from our eternal, inveterate habit of sticking to wrong names—for example, 'locust' for *cicada*, 'buffalo' for *bison*, and other misused terms that might be cited".

Had the policy employed the words "violent windstorm" it would in practical application have been inexpressive and vague. Had it added the word "destructive" it might have been too narrow for the assured and too liberal for the insurer. But in the use of the more generic term "cyclone", in its up-to-date significance, it clearly enough expressed and included that character of windstorm distinguished by its concentrated force and violence, so resistless as to make it especially destructive in its narrow pathway to property like buildings.

Under the construction contended for by the learned counsel for plaintiffs, and as expressed in the charge of the court, had this windstorm come, like an avalanche of mighty waters, against the plaintiffs' building and crushed it like an egg shell, as it did buildings of lesser strength, yet the insurance company should be held for damages, unless it should be shown that "in addition, it was characterized by high winds rotating about a center of low atmospheric pressure and this center moving onward with greater or less velocity, etc."

The spirit of the common law is the instinct of practical sense. Courts are most apt to approximate absolute justice in construing a controverted term in a business contract, like the one under review, by giving to it a practicable comprehensible application, rather than one so technical and theoretical as only to obscure and mystify. "For the letter killeth, but the spirit giveth life". The failure to observe this, in seeking to solve the import of the term "cyclone", as employed in the ninth condition of the insurance contract, doubtless furnished the jury the only conceivable pretext for finding the issue for the plaintiffs.

Reversing the situation: Had the policy contract insured against loss resulting from a cyclone, the insurance company defending on the ground that the windstorm in question was not a cyclone, can it be imagined that the same jury would not have found the issue for the plaintiffs, had they not been confused or felt coerced by the charge of the court imposing the necessity of direct proof of the presence in the wind of the technical qualities of a meteorological definition?

There being no disputable evidence on which reasonable minds ought to differ as to the windstorm being of the popular conception of a cyclone, as that term was employed in the policy, the court should have granted the request of the defendant for a directed verdict. The judgment of the Circuit Court is, therefore, reversed, and the cause is remanded with directions to grant a new trial.

THUNDERSTORMS AND SQUALLS.

The Editor regrets that time and opportunity have not allowed him as yet to make a résumé of our steady progress in the knowledge of the origin and mechanical phenomena attending squalls and thunderstorms. This is a matter that has been especially developed of late years by M. Durand-Gréville. We should be very glad if some one of our physicists would contribute to the MONTHLY WEATHER REVIEW a review of the work that has been done along this line of study, beginning with Espy's reports and maps of 1836. Thus for a long time we have known in a general way that thunderstorms occur principally on the south and east sides of an area of low pressure, that in fact they represent the front of a slowly descending mass of air moving northeastward and underrunning and lifting up the air near the ground, just as the cold blizzards represent slowly descending air moving southeast, on the western side of a central area of low pressure. The blizzard is a winter phenomenon while the thunderstorm is a summer phenomenon. But Durand-Gréville has added to our knowledge by showing that in every thunderstorm and squall we have a ribbon (ruban) of isobars squeezed close together, so that the isobaric chart reminds one of the graining in the surface of a beam of wood "quarter-sawed". In fact the ancient usage of French mariners is to speak of a "squall of wind" as a "grain", altho we know not the etymology of this French word. Durand-Gréville has for many years made a special study of the isobars attending these wind squalls or grains. The last paper by him was presented to the recent international competition in the prediction of the weather (Liege, 1905), and is published in full in the bulletin of the Belgian Astronomical Society, for March and June, 1906. Apparently there are very few instances in which squalls can not be foreseen by one who follows up this line of study. The memoirs by Durand-Gréville remind us of the following paper published long since by Dr. Gustavus Hinrichs and Prof. Frederick Starr.

In a first paper on the thunderstorms of Iowa, published in the Proceedings of the Davenport Academy, December, 1887, Vol. V, pages 81–99, Prof. Frederick Starr, Ph. D., of Coe College, Cedar Rapids, entered on his special study of thunderstorms for that State. Altho he had only 54 reporters for the first summer yet many interesting features were brought out. Doctor Starr stated that he was not "a professional meteorologist", but he had "a great desire to see Iowa thunderstorms carefully studied", and believed it to be a subject that would repay diligent work. We fully agree with him in this latter belief, and hope that someone may collate and analyze the data that have been published for that year, and that in fact one will be found to make special studies of the origin and development of thunderstorms in each section of our country. Just as soon as such a study has been made in the region within 50 miles around any large city it should be possible to invert the problem, and from the beginning predict whether or no the thunderstorm will in a few hours trouble that city.

We quote the following paragraphs from Doctor Starr's first paper:

Three kinds of thunderstorms seem to be reported—

First.—Storms, well defined, traveling from the west, or a western quarter, toward an eastern quarter. Time records, properly made, supply data for calculating the rate of progress eastward. These are apparently connected with the general atmospheric circulation of the United States, and occur in the southeast quadrant of a "low" area.

Second.—Heat storms, local in character; not showing a progressive movement; often unaccompanied by any wind; seldom beginning until 4 p. m. in the afternoon, or in the evening, followed by a later instalment in the early morning. They accompany extremely hot weather.

Third.—"Squalls", which are well characterized by Doctor Hinrichs in his "Bulletins" for June and July, 1882. His account has been quoted by others, but may again be copied here for Iowa readers.

"Our Iowa squalls are as serious as any on the ocean; the wind may be destructive, but it is not lifting or revolving as it is in the tornado. Roughly speaking, the squall may be likened to an extended tornado, having its axis parallel to the ground. Here, in Iowa, it generally bursts upon us from the northwest, following the southeast wind; it rolls over and strikes down upon us, usually with abundant precipitation, and soon is succeeded by the same southeast wind which it so abruptly displaced. So far as I have studied them, they come down from the northwest, progressing at the rate of 20 to 50 miles an hour. In northeastern Iowa the storm front has a tendency to bend up, so as to make the squall more nearly from the west. In like manner in southwestern Iowa its front bends westward, and hence blows more nearly from the north. The storm front is fierce in its power along a considerable distance—20 to 50 miles or more, in its front, along the earth, are struck simultaneously. As the great storm front moves on, it can be traced for 350

miles from northwest to southeast through our State. It is impossible to confound this storm with the tornado, which is fortunately very restricted in its field, mowing a swath of destruction, generally, in a direction corresponding to the line of the squall storm front, from a southwesterly toward a northeasterly point. The tornado is narrow, local; the squall at a given instant reaches a narrow, long-extended belt of land like a tornado track, but this belt of destruction is carried forward with great velocity so as gradually to sweep over a large part of the State. Again, the squall of summer is radically different from the blizzard of winter. The squall comes, reaches us, and after a few minutes leaves us, moving onward in its general course toward the southeast; the blizzard blows for hours, and even days. In the squall, but a limited amount of air comes down from the northwest, a great roll of cold and dense air falling upon us; in the blizzard, the entire atmosphere covering several States is moving as one body toward the southeast."

* * * * * * *

Three cases are mentioned of dead horses found at the barbed wire fence. I would like references to similar cases elsewhere.

The barbed wire fence, which has spread so widely since 1875, has come to be recognized as a dangerous form of lightning conductor, and the injuries to cattle are innumerable; but we believe it has been abundantly shown that the danger is entirely dissipated if only the posts to which the fence is attached are properly connected by a wire to a moist soil below. In this way every post becomes a conductor, instead of an insulator, and the electricity is carried safely below.

The distinction between the destructive winds of a tornado, a hurricane, a blizzard, a straight-line squall or derecho, as it is called by Hinrichs, or the vents de grains, as they are called by Durand-Gréville, is important for several reasons. The insurance companies, if policies specify insurance against tornadoes, are very likely to evade payment if it can be shown that the destructive wind belonged to the squall or some other class, so that farmers would do well to see to it that when they insure against damage by lightning, rain, hail, winds, etc., the policy shall say just that and no more, omitting all reference to tornadoes, squalls, cyclones, hurricanes, etc.

CLIMATOLOGY OF SPRINGFIELD, MO.

By N. R. TAYLOR.

Springfield, Mo., latitude 37° 12′ north, and longitude 93° 18′ west, is situated near the center of Greene County, of which it is the seat of justice, and is located in that part of the State popularly known as "Southwest Missouri". It is about 90 miles east of the point where Kansas and the Indian Territory touch the State of Missouri, and about 60 miles north of the Arkansas line. It is 239 miles southwest of St. Louis, and 194 miles southeast of Kansas City.

As regards topography, the city lies near the center of an extensive section known as the "Ozark Plateau", which is a culmination of the gradual rise that begins south of the Missouri River and ends in the northern portion of Arkansas. This plateau slowly decreases in height and rapidly increases in ruggedness as the border of Arkansas is approached.

"The great watershed of the Ozark uplift, which is, in general, followed by the St. Louis and San Francisco railroad, divides the district into two slopes. The waters on the north flow into the Missouri; those on the south into the White River".[1]

The site of the city itself, is, on the whole, level, the only exception being a narrow and shallow valley that slopes toward Wilsons Creek, a small stream running approximately westward, and roughly forming a dividing line between the northern and southern halves of the city.

In so far as tabulated data are concerned, the meteorological history of Springfield begins in 1877. In February of that year observations of temperature and rainfall were begun by Mr. A. M. Lapham, whose records extend thru 1879, except that observations of temperature were mist during the months of March, October, November, and December, 1879, and rainfall measurements were omitted in December, 1879. Observations were resumed in 1884 by Prof. E. M. Shepard, whose records of temperature extend from April of that year to June, 1887, inclusive, except the months of June and November, 1886, and whose rainfall records extend from May, 1884, to September, 1887, inclusive, except the month of June, 1886.

It is regretted that no reliable records exist for the full four years ending with 1883, as tradition recounts the occurrence of several meteorological events of more than passing interest during this period.

A record of rainfall from January, 1877 to December, 1887, inclusive, is compiled in The Report of the Missouri Rainfall, by Francis E. Nipher; but owing to the fact that the rainfall for the entire year of 1881, and for several months in other years, is interpolated, the normals being substituted for the missing data, only such records as are shown to be the result of actual observation are here quoted. A note in the publication referred to, describing the kind of rain gages used, the manner in which they are exposed, and the care with which observations were taken, is accepted as evidence of the accuracy of such of the data as appear in the accompanying table.

On September 27, 1887, an observing station was established at Springfield by the United States Government. It was then under the Signal Corps of the Army, but since June 30, 1891, has been under the Weather Bureau, Department of Agriculture. Since the establishment of this station all meteorological elements have been regularly and systematically recorded.

In addition to the tabulated matter in the accompanying tables, there are many authentic accounts of phenomenal weather conditions which have occurred in this section during its early history.

In the history of Greene County, Missouri, published by Perkins and Horne in 1883, the following notes are found:

The winter of 1834–5 was unusually cold. The "cold Friday and Saturday" will long be remembered. Cattle had their horns frozen, pigs and fowls perished in great numbers, and there was much damage done to fruit trees. The snow drifted to extraordinary depths, lying on the ground from December to March. It was impossible, in many cases, to go to mill or to a store, owing to the distance and the condition of the roads, so the hominy block was called into use to supply breadstuff, and the "store goods" were dispensed with.

In November, 1848, came the "big sleet", as it was afterwards known. The sleet began falling, and then came rain, hail, and freezing weather, alternately, until the ice covered the ground to a depth of 3 or 4 inches. Timber was broken down, and travel almost suspended.

The winter of 1855 was an exceptionally hard one in Greene County. On the 4th and 5th of February of that year the thermometer stood at 20° below zero, and the snow lay upon the ground to the unprecedented depth of from 18 to 20 inches. On the 19th of August following there was a sharp frost.

On January 23, 1856, snow fell in the county to a depth of 14 inches.

On the 25th of June, 1875, an extraordinary rainstorm visited Greene County. Every little stream became a river, and all creeks were out of bank, causing great destruction of property. Wilsons Creek in Springfield was 100 yards wide. The damage done in Springfield was at least $5000. This storm was general throughout southwest Missouri.

In July, 1876, the Pomme de Terre, a small stream that flows through the northern part of the county, was extraordinarily full on account of the freshets from heavy rains. Widespread damage occurred to farms lying along the banks of this stream. The height of the water was from 3 to 4 feet higher than it was ever known.

Reports indicate that all streams in southwest Missouri were out of bank in July, 1876. when, according to many verbal accounts from the older inhabitants, the heaviest rainfall occurred that was ever known in this section.

In a small pamphlet, entitled "Greene County, its Resources and Advantages", the following account of an exceptionally early spring is found:

In 1878, full-grown potatoes were eaten on the first day of May, and peas on the 5th. Strawberries, grown in the open air, were ripe on April the 5th. Peaches were ripe on the 15th of June, and corn on the 25th of that month.

The following is from the history of Greene Conuty:

The drought of 1881 will not soon be forgotten by the farmers of

[1] Geology of Greene County, Mo., by Prof. E. M. Shepard.